

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 April 2004 (01.04.2004)

PCT

(10) International Publication Number
WO 2004/027200 A3

(51) International Patent Classification⁷: **E21B 43/10,**
23/00

(21) International Application Number:
PCT/US2003/029460

(22) International Filing Date:
22 September 2003 (22.09.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/412,488 20 September 2002 (20.09.2002) US

(71) Applicant (for all designated States except US): **ENVEN-**
TURE GLOBAL TECHNOLOGY [US/US]; 16200 A Park
Row, Houston, TX 77084 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **WATSON, Brock,**
Wayne [US/US]; 2535 Marsh Lane #1004, Carrollton,
TX 75006 (US). **BRISCO, David, Paul** [US/US]; 405
Westridge Drive, Duncan, OK 73533 (US).

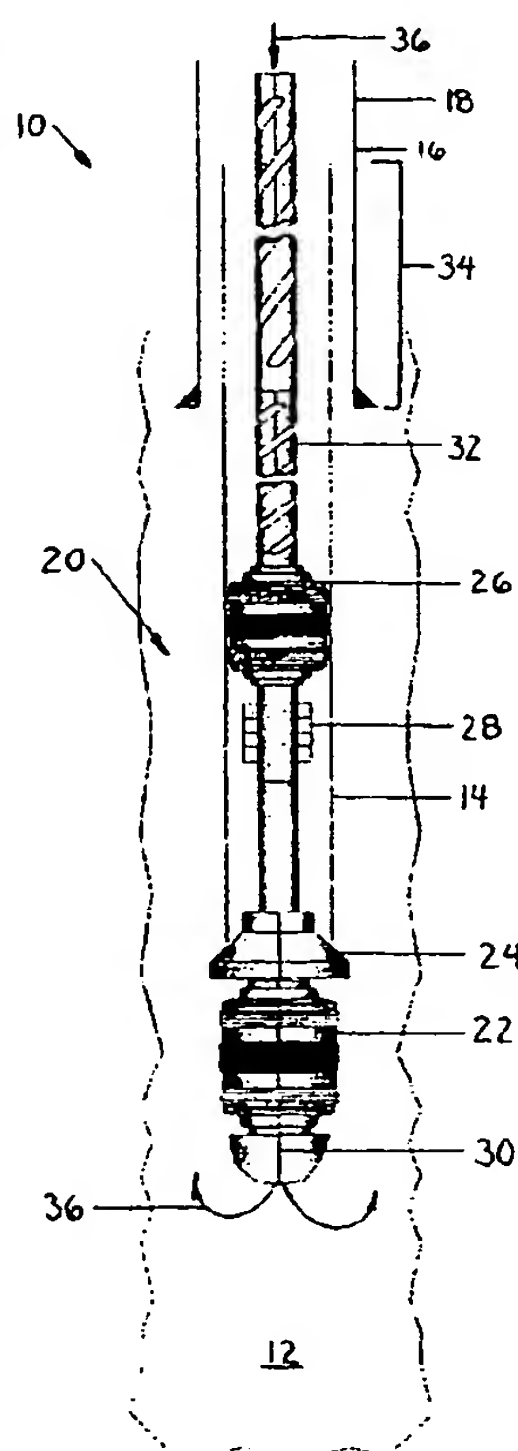
(74) Agents: **MATTINGLY, Todd et al.**; Haynes and Boone,
L.L.P., Suite 3100, 901 Main Street, Dallas, TX 75202-3789
(US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SK, SL,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA,
ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW).

[Continued on next page]

(54) Title: **BOTTOM PLUG FOR FORMING A MONO DIAMETER WELLBORE CASING**



(57) Abstract: A bottom plug and a method of using a bottom plug for forming a mono diameter wellbore casing (18) is provided that includes an expandable packer (22) initially attached below an expansion device (24). A packer setting mechanism (40) is coupled between the expansion device (24) and the packer (22) for expanding a packer (22) and sealingly setting it in an expanded portion (38) of the wellbore casing (14). A release mechanism (52) is coupled between the expansion device (24) and the packer (22) for releasing packer (22) from the expansion device (24). Fluid (36) is pumped into the casing (14) between the cone (24) and the packer (22) to force the expansion device (24) into and through an unexpanded portion of casing (14), thereby expanding the casing (14).

WO 2004/027200 A3

BEST AVAILABLE COPY



Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— with amended claims

(88) Date of publication of the international search report:
29 July 2004

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

Date of publication of the amended claims:

30 September 2004

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AMENDED CLAIMS

[received by the International Bureau on 22 July 2004 (22.07.04);
Original claims 1-25 unchanged; new claims 26-49 added (7 pages).]

pumping fluid into the expandable tubular member between the expansion device and the set and expanded expandable bottom packer to facilitate forcing the expansion device through the expandable tubular member to expand a second portion of the expandable tubular member.

21. The method for forming a mono diameter wellbore casing of claim 20, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises:

gripping the expandable tubular member with an anchor device supported by the drill pipe;

coupling an actuator between the anchor and the expansion cone; and

moving the expansion device with the actuator partially into the expandable tubular member to form the first expanded portion of the expandable tubular member.

22. The method for forming a mono diameter wellbore casing of claim 20, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using an adjustable expansion device.

23. The method for forming a mono diameter wellbore casing of claim 20, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using a rotary expansion device.

24. The method for forming a mono diameter wellbore casing of claim 20, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using a compliant expansion device.

25. The method for forming a mono diameter wellbore casing of claim 20, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using a hydroforming expansion device.

26. A method for forming a mono diameter wellbore casing, comprising
connecting an expansion cone to a tubular support;
supporting an expandable tubular member with the tubular support at a

position above the expansion cone;
inserting the expandable tubular member into the wellbore;
expanding a first portion of the expandable tubular member with the expansion cone;
sealing off the first expanded portion of the expandable tubular member; and
pumping fluid into the expandable tubular member between the expansion cone and the sealed off first expanded portion of the expandable tubular member to force the expansion cone through the expandable tubular member to expand a second portion of the expandable tubular member.

27. The method of claim 26, wherein expanding the first portion of the expandable tubular member with the expansion cone further comprises
gripping the expandable tubular member with an anchor device supported by the drill pipe;
coupling an actuator between the anchor and the expansion cone; and
moving the expansion cone with the actuator partially into the expandable tubular member to form the first expanded portion of the expandable tubular member.

28. A method for forming a mono diameter wellbore casing, comprising:
connecting an expansion device to a tubular support;
supporting an expandable tubular member with the tubular support at position above the expansion device;
inserting the expandable tubular member into the wellbore;
expanding a first portion of the expandable tubular member with the expansion device;
sealingly off the first expanded portion of the expandable tubular member;
and
pumping fluid into the expandable tubular member between the expansion device and the sealed off first expanded portion of the expandable tubular member to facilitate forcing the expansion device through the expandable tubular member to expand a second portion of the

expandable tubular member.

29. The method of claim 28, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises:
- gripping the expandable tubular member with an anchor device supported by the drill pipe;
 - coupling an actuator between the anchor and the expansion cone; and
 - moving the expansion device with the actuator partially into the expandable tubular member to form the first expanded portion of the expandable tubular member.
30. The method of claim 28, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using an adjustable expansion device.
31. The method of claim 28, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using a rotary expansion device.
32. The method of claim 28, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using a compliant expansion device.
33. The method of claim 28, wherein expanding the first portion of the expandable tubular member with the expansion device further comprises expanding using a hydroforming expansion device.
34. A system for forming a mono diameter wellbore casing, comprising
- means for connecting an expansion cone to a tubular support;
 - means for coupling an expandable bottom packer to and below the expansion cone;
 - means for supporting an expandable tubular member with the tubular support at position above the expansion cone;

means for inserting the expandable tubular member into the wellbore;
means for expanding a first portion of the expandable tubular member with the expansion cone;
means for sealingly setting the expanded expandable bottom packer in the first expanded portion of the expandable tubular member;
means for releasing the expandable bottom packer from the expansion cone;
and
means for pumping fluid into the expandable tubular member between the expansion cone and the set and expanded expandable bottom packer to force the expansion cone through the expandable tubular member to expand a second portion of the expandable tubular member.

35. The system of claim 34, wherein means for expanding the first portion of the expandable tubular member with the expansion cone further comprises

means for gripping the expandable tubular member with an anchor device supported by the drill pipe;
means for coupling an actuator between the anchor and the expansion cone;
and
means for moving the expansion cone with the actuator partially into the expandable tubular member to form the first expanded portion of the expandable tubular member.

36. A system for forming a mono diameter wellbore casing, comprising
means for connecting an expansion device to a tubular support;
means for coupling an expandable bottom packer to and below the expansion device;
means for supporting an expandable tubular member with the tubular support at position above the expansion device;
means for inserting the expandable tubular member into the wellbore;
means for expanding a first portion of the expandable tubular member with the expansion device;
means for sealingly setting the expanded expandable bottom packer in the first expanded portion of the expandable tubular member;

means for releasing the expandable bottom packer from the expansion device; and

means for pumping fluid into the expandable tubular member between the expansion device and the set and expanded expandable bottom packer to facilitate forcing the expansion device through the expandable tubular member to expand a second portion of the expandable tubular member.

37. The system of claim 36, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises:

means for gripping the expandable tubular member with an anchor device supported by the drill pipe;

means for coupling an actuator between the anchor and the expansion cone; and

means for moving the expansion device with the actuator partially into the expandable tubular member to form the first expanded portion of the expandable tubular member.

38. The system of claim 36, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using an adjustable expansion device.

39. The system of claim 36, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using a rotary expansion device.

40. The system of claim 36, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using a compliant expansion device.

41. The system of claim 36, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using a hydroforming expansion device.

42. A system for forming a mono diameter wellbore casing, comprising
means for connecting an expansion cone to a tubular support;
means for supporting an expandable tubular member with the tubular support
at a position above the expansion cone;
means for inserting the expandable tubular member into the wellbore;
means for expanding a first portion of the expandable tubular member with
the expansion cone;
means for sealing off the first expanded portion of the expandable tubular
member; and
means for pumping fluid into the expandable tubular member between the
expansion cone and the sealed off first expanded portion of the
expandable tubular member to force the expansion cone through the
expandable tubular member to expand a second portion of the
expandable tubular member.
43. The system of claim 42, wherein means for expanding the first portion of the
expandable tubular member with the expansion cone further comprises
means for gripping the expandable tubular member with an anchor device
supported by the drill pipe;
means for coupling an actuator between the anchor and the expansion cone;
and
means for moving the expansion cone with the actuator partially into the
expandable tubular member to form the first expanded portion of the
expandable tubular member.
44. A system for forming a mono diameter wellbore casing, comprising:
means for connecting an expansion device to a tubular support;
means for supporting an expandable tubular member with the tubular support
at position above the expansion device;
means for inserting the expandable tubular member into the wellbore;
means for expanding a first portion of the expandable tubular member with
the expansion device;

means for sealing off the first expanded portion of the expandable tubular member, and

means for pumping fluid into the expandable tubular member between the expansion device and the sealed off first expanded portion of the expandable tubular member to facilitate forcing the expansion device through the expandable tubular member to expand a second portion of the expandable tubular member.

45. The system of claim 44, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises:

means for gripping the expandable tubular member with an anchor device supported by the drill pipe;

means for coupling an actuator between the anchor and the expansion cone;

and

means for moving the expansion device with the actuator partially into the expandable tubular member to form the first expanded portion of the expandable tubular member.

46. The system of claim 44, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using an adjustable expansion device.

47. The system of claim 44, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using a rotary expansion device.

48. The system of claim 44, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using a compliant expansion device.

49. The system of claim 44, wherein means for expanding the first portion of the expandable tubular member with the expansion device further comprises means for expanding using a hydroforming expansion device.

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

☒ **BLACK BORDERS**

☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**

☐ **FADED TEXT OR DRAWING**

☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**

☐ **SKEWED/SLANTED IMAGES**

☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**

☐ **GRAY SCALE DOCUMENTS**

☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**

☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**

☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.